

8961726 TEXAS INSTR (OPTO)

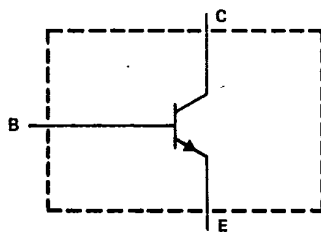
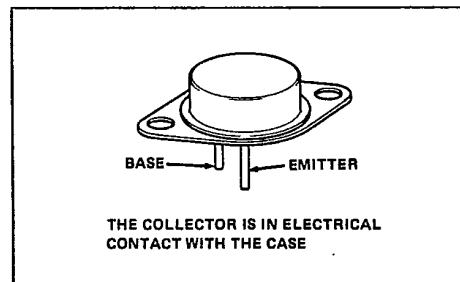
62C 37019 D

TIPL752, TIPL752A
N-P-N SILICON POWER TRANSISTORS

7-33-13

OCTOBER 1982 - REVISED OCTOBER 1984

- 150 W at 25°C Case Temperature
- 6 A Continuous Collector Current
- 12 A Peak Collector Current
- Operating Characteristics Fully Guaranteed at 100°C
- Transient Power Dissipation Guaranteed at 100°C
- $I_{CES} < 100 \mu A$ at Maximum Rated V_{CE} at 100°C
- 1000 V Blocking Capability
- High Sustaining Voltage
 TIPL752 . . . 350 V Min.
 TIPL752A . . . 400 V Min.
- Specifically Designed for High-Voltage, Inductive-Load Switching Applications

device schematic**TO-3 PACKAGE****absolute maximum ratings at 25°C case temperature (unless otherwise noted)**

	TIPL752	TIPL752A
Collector-base voltage	800 V	1000 V
Collector-emitter voltage ($V_{BE} = 0$)	800 V	1000 V
Collector-emitter voltage ($I_B = 0$)	350 V	400 V
Base-emitter voltage	10 V	
Continuous collector current	6 A	
Peak collector current (see Note 1)	12 A	
Continuous device dissipation at (or below) 25°C case temperature (see Figure 12)	150 W	
Operating junction and storage temperature range	- 65°C to 200 °C	

NOTE 1: This value applies for $t_W \leq 10$ ms, duty cycle $\leq 2\%$.

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electrical characteristics at 25°C case temperature (unless otherwise noted)

PARAMETER	TEST CONDITIONS	TIPL752			TIPL752A			UNIT
		MIN	TYP	MAX	MIN	TYP	MAX	
$V_{CEO(sus)}$	$I_C = 0.1\text{ A}$, $L = 25\text{ mH}$, See Note 2	350			400			V
I_{CEO}	$V_{CE} = 350\text{ V}$, $I_B = 0$ $V_{CE} = 400\text{ V}$, $I_B = 0$		50			50		μA
I_{CES}	$V_{CE} = 800\text{ V}$, $V_{BE} = 0$		50					μA
	$V_{CE} = 1000\text{ V}$, $V_{BE} = 0$					50		
	$V_{CE} = 800\text{ V}$, $V_{BE} = 0$, $T_C = 100^\circ\text{C}$		100					
	$V_{CE} = 1000\text{ V}$, $V_{BE} = 0$, $T_C = 100^\circ\text{C}$					100		
I_{EBO}	$V_{EB} = 10\text{ V}$, $I_C = 0$		1			1		mA
h_{FE}	$V_{CE} = 5\text{ V}$, $I_C = 0.5\text{ A}$, See Notes 3 and 4	15	60		15	60		
$V_{CE(sat)}$	$I_C = 2\text{ A}$, $I_B = 0.4\text{ A}$, See Notes 3 and 4		0.5			0.5		V
	$I_C = 4\text{ A}$, $I_B = 0.8\text{ A}$, See Notes 3 and 4		1			1		
	$I_C = 6\text{ A}$, $I_B = 1.2\text{ A}$, See Notes 3 and 4		2.5			2.5		
	$I_C = 6\text{ A}$, $I_B = 1.2\text{ A}$, See Notes 3 and 4, $T_C = 100^\circ\text{C}$		5			5		
$V_{BE(sat)}$	$I_C = 2\text{ A}$, $I_B = 0.4\text{ A}$, See Notes 3 and 4		1.1			1.1		V
	$I_C = 4\text{ A}$, $I_B = 0.8\text{ A}$, See Notes 3 and 4		1.3			1.3		
	$I_C = 6\text{ A}$, $I_B = 1.2\text{ A}$, See Notes 3 and 4		1.5			1.5		
	$I_C = 6\text{ A}$, $I_B = 1.2\text{ A}$, See Notes 3 and 4, $T_C = 100^\circ\text{C}$		1.4			1.4		
f_T	$V_{CE} = 10\text{ V}$, $I_C = 0.5\text{ A}$, See Note 5		7			7		MHz
C_{obo}	$V_{CB} = 20\text{ V}$, $I_E = 0$, $f = 0.1\text{ MHz}$		105			105		pF

NOTES: 2. Inductive loop switching measurement.

3. These parameters are measured using pulse techniques, pulse duration = 300 μs , duty cycle $\leq 2\%$.

4. These parameters are measured with voltage-sensing contacts separate from the current-carrying contacts and located within 3.2 mm (0.125 inch) from the device body.

5. To obtain f_T , the $|h_{fe}|$ response is extrapolated at the rate of -6 dB per octave from $f = 1\text{ MHz}$ to the frequency at which $|h_{fe}| = 1$.

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thermal characteristics

PARAMETER	MIN	TYP	MAX	UNIT
$R_{\theta JC}$		1.17		$^{\circ}\text{C/W}$

resistive-load switching characteristics (unless otherwise noted)

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{on}	$I_C = 6\text{ A}, V_{CC} = 200\text{ V}, I_{B1} = 1.2\text{ A},$ $I_{B2} = -1.2\text{ A}, T_C = 25^{\circ}\text{C},$ See Figure 1		1		μs
t_s			2.5		μs
t_f			0.45		μs
t_{on}	$I_C = 6\text{ A}, V_{CC} = 200\text{ V}, I_{B1} = 1.2\text{ A},$ $I_{B2} = -1.2\text{ A}, T_C = 100^{\circ}\text{C},$ See Figure 1		2.5		μs
t_s			3		μs
t_f			1		μs

inductive-load switching characteristics (unless otherwise noted)

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{sv}	$I_C = 6\text{ A}, I_{B1} = 1.2\text{ A}, T_C = 25^{\circ}\text{C},$ $V_{BE(off)} = -10\text{ V},$ See Figure 2		2.5		μs
t_{rv}			200		ns
t_{fi}			150		ns
t_{ti}			60		ns
t_{xo}			300		μs
t_{sv}	$I_C = 6\text{ A}, I_{B1} = 1.2\text{ A}, T_C = 100^{\circ}\text{C},$ $V_{BE(off)} = -10\text{ V},$ See Figure 2		3		μs
t_{rv}			300		ns
t_{fi}			150		ns
t_{ti}			50		ns
t_{xo}			500		ns

TIPL Devices

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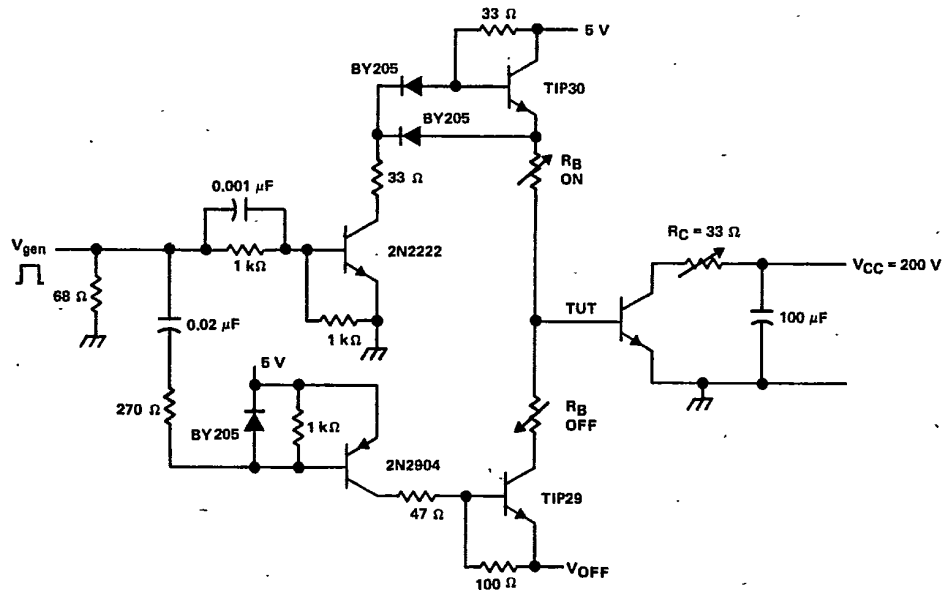
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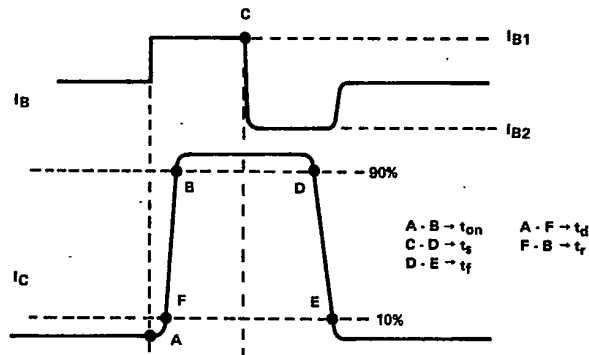
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N-P-N SILICON POWER TRANSISTORS

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PARAMETER MEASUREMENT INFORMATION



TEST CIRCUIT



CURRENT WAVEFORMS

- NOTES: A. The V_{gen} waveform is supplied by the following characteristics: $t_r \leq 15$ ns, $t_f \leq 15$ ns, $Z_{out} = 50 \Omega$, $t_w = 20 \mu$ s, duty cycle $\leq 2\%$.
 B. Waveforms are monitored on an oscilloscope with the following characteristics: $t_r \leq 15$ ns, $R_{in} \geq 10$ M Ω , $C_{in} \leq 11.5$ pF.
 C. Resistors must be noninductive types.

FIGURE 1. RESISTIVE-LOAD SWITCHING

TIPL Devices

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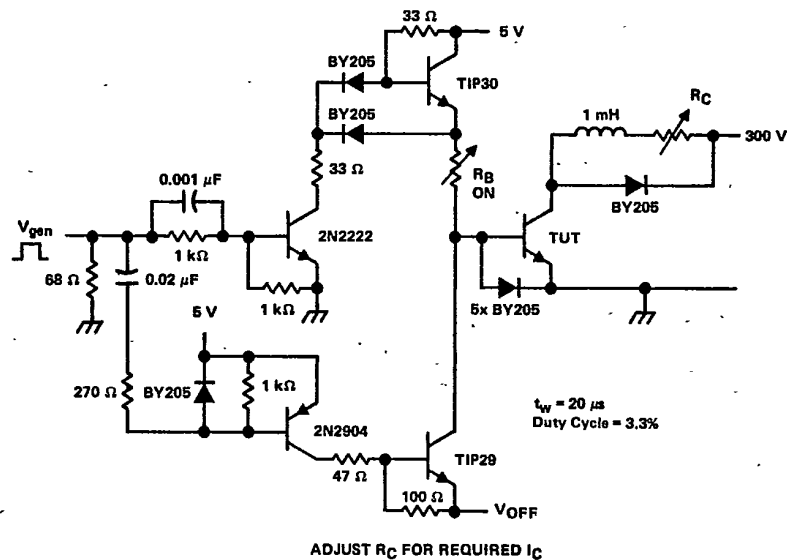
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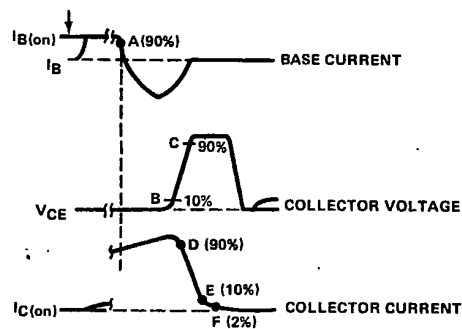
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N-P-N SILICON POWER TRANSISTORS

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PARAMETER MEASUREMENT INFORMATION



TEST CIRCUIT



VOLTAGE AND CURRENT WAVEFORMS

NOTES: A. Waveforms are monitored on an oscilloscope with the following characteristics: $t_r \leq 15$ ns, $R_{in} \geq 10$ M Ω , $C_{in} \leq 11.5$ pF.
B. Resistors must be noninductive types.

FIGURE 2. INDUCTIVE-LOAD SWITCHING

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TYPICAL CHARACTERISTICS

RESISTIVE-LOAD TURN-OFF TIME
vs
BASE CUTOFF CURRENT

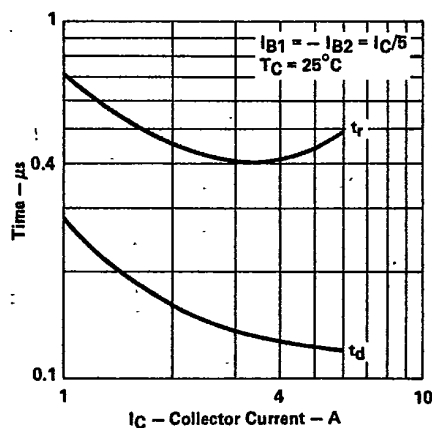


FIGURE 3

RESISTIVE-LOAD TURN-OFF TIME
vs
COLLECTOR CURRENT

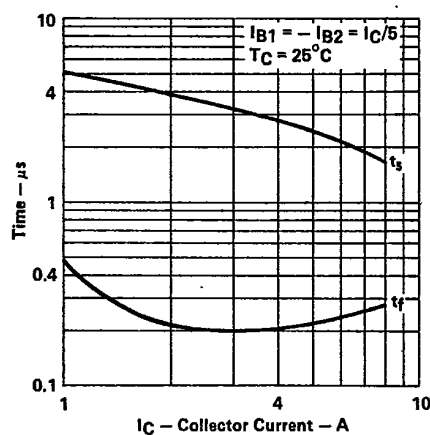


FIGURE 4

COLLECTOR-EMITTER SATURATION VOLTAGE
vs
BASE CURRENT

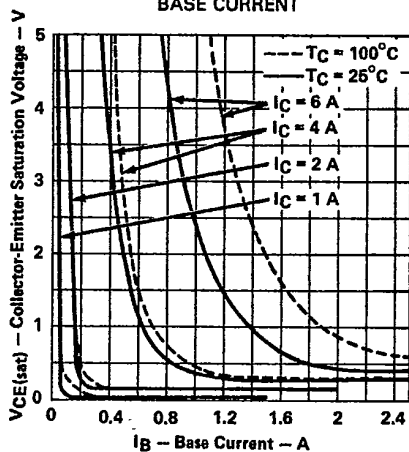


FIGURE 5

BASE-EMITTER SATURATION VOLTAGE
vs
BASE CURRENT

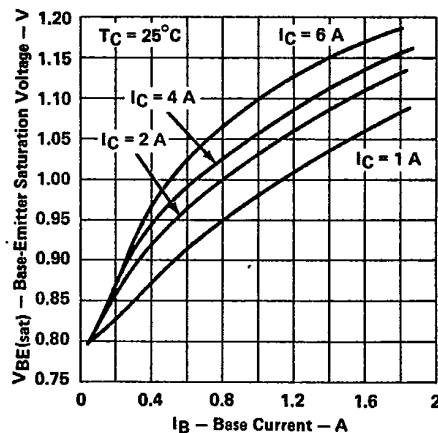


FIGURE 6

TIPL Devices



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TYPICAL CHARACTERISTICS

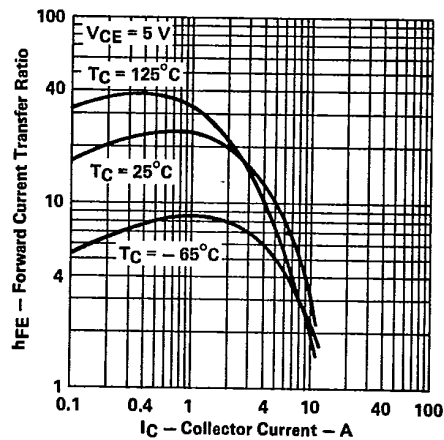
FORWARD CURRENT TRANSFER RATIO
VS
COLLECTOR CURRENT

FIGURE 7

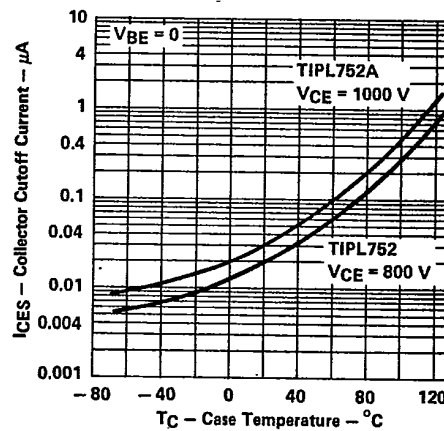
COLLECTOR CUTOFF CURRENT
VS
CASE TEMPERATURE

FIGURE 8

MAXIMUM SAFE OPERATING AREA

FORWARD-BIAS SAFE OPERATING AREA

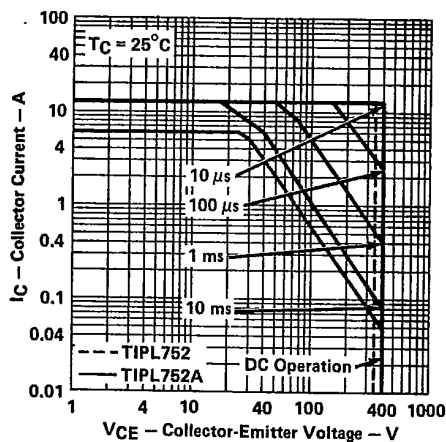


FIGURE 9

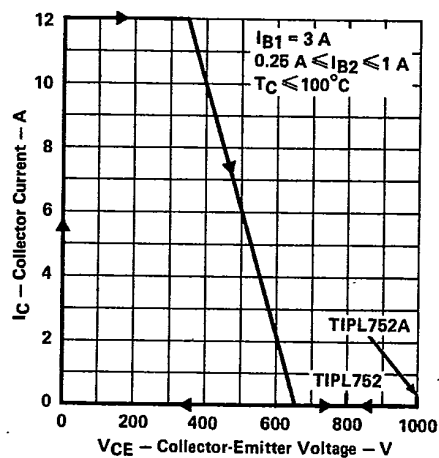
LIMITING CONDITIONS
FOR POWER-DOWN TRANSIENT

FIGURE 10

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THERMAL INFORMATION

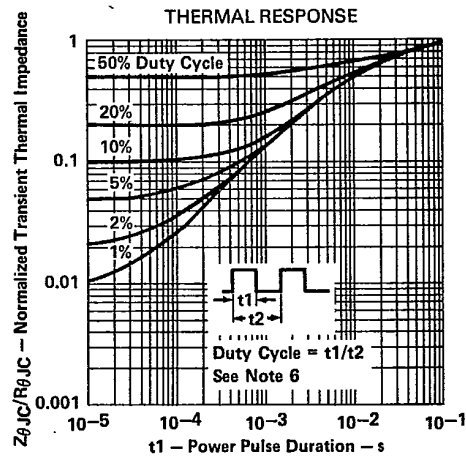


FIGURE 11

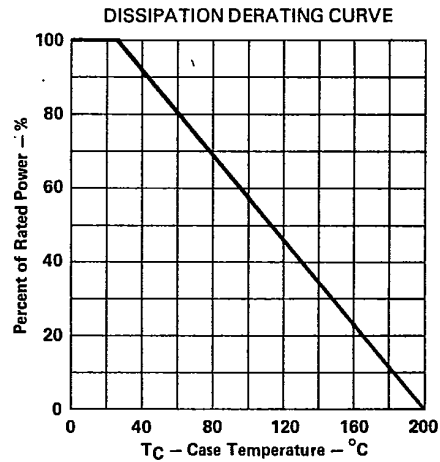


FIGURE 12

NOTE 6: Read time at end of t_1 , $T_{J(\text{max})} - T_C = P_{D(\text{peak})} \cdot \left(\frac{Z_{\theta JC}}{R_{\theta JC}} \right) \cdot R_{\theta JC(\text{max})}$.

TIPL Devices

